



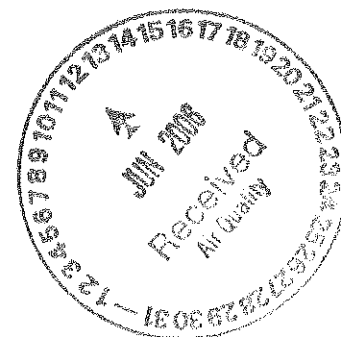
UTILITIES CO.

A Division of MDU Resources Group, Inc.

400 North Fourth Street
Bismarck, ND 58501
(701) 222-7900

June 9, 2006

Mr. Terry O'Clair, Director
Division of Air Quality
North Dakota Department of Health
918 E. Divide Avenue
Bismarck, ND 58501-1947



Re: Heskett Unit 2 BART Modeling Refinements

Dear Mr. O'Clair:

This letter is in reference to your letter dated November 30, 2005, in which the Department states our Heskett Unit 2 is subject to BART. Since the modeling results for Unit 2 were under the "causes" impairment level of 1.0 dv, but over the "contributes to" impairment level of 0.5 dv, Montana-Dakota Utilities Co. retained ENSR to evaluate the previous modeling.

In conducting their review, ENSR determined it is appropriate to refine the grid size in the model from 3 km to 1 km and to use the average background visibility to determine the change caused by Unit 2, in accordance with the recently announced EPA court settlement. These changes, even when offset by using speciated particulate matter inputs, consistent with National Park Service guidance, provide model results that are less than the "contributes to" impairment level, thus indicating that Unit 2 does not contribute to visibility impairment and that it is not subject to BART. These model results were based on the currently authorized and permitted allowable emissions from Unit 2.

Separately, and as we have previously discussed, Montana-Dakota will nonetheless voluntarily commit to control SO₂ emissions by installing and operating the necessary equipment to use limestone as the bed material in the boiler. Montana-Dakota will agree to include a condition in our Title V permit implementing this change, including a permit shield pertaining to BART applicability. We will be in contact at a later date to discuss the details of the permit modification.

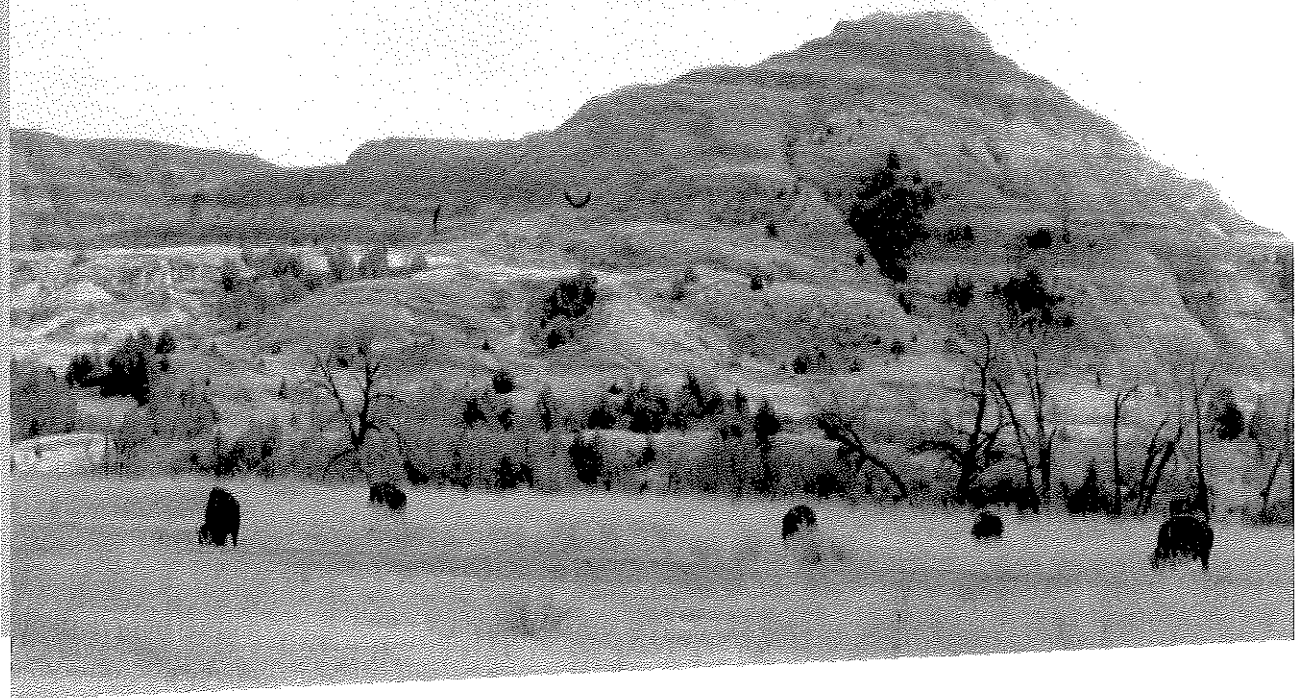
We look forward to your concurrence with the attached refined modeling report and determination that Heskett Unit 2 is not subject to BART. If you have any questions regarding this submittal, please contact Jay Skabo at 222-7835.

Sincerely,

A handwritten signature in cursive script, appearing to read 'Andrea Stomberg'.

Andrea Stomberg
Vice President — Electric Supply

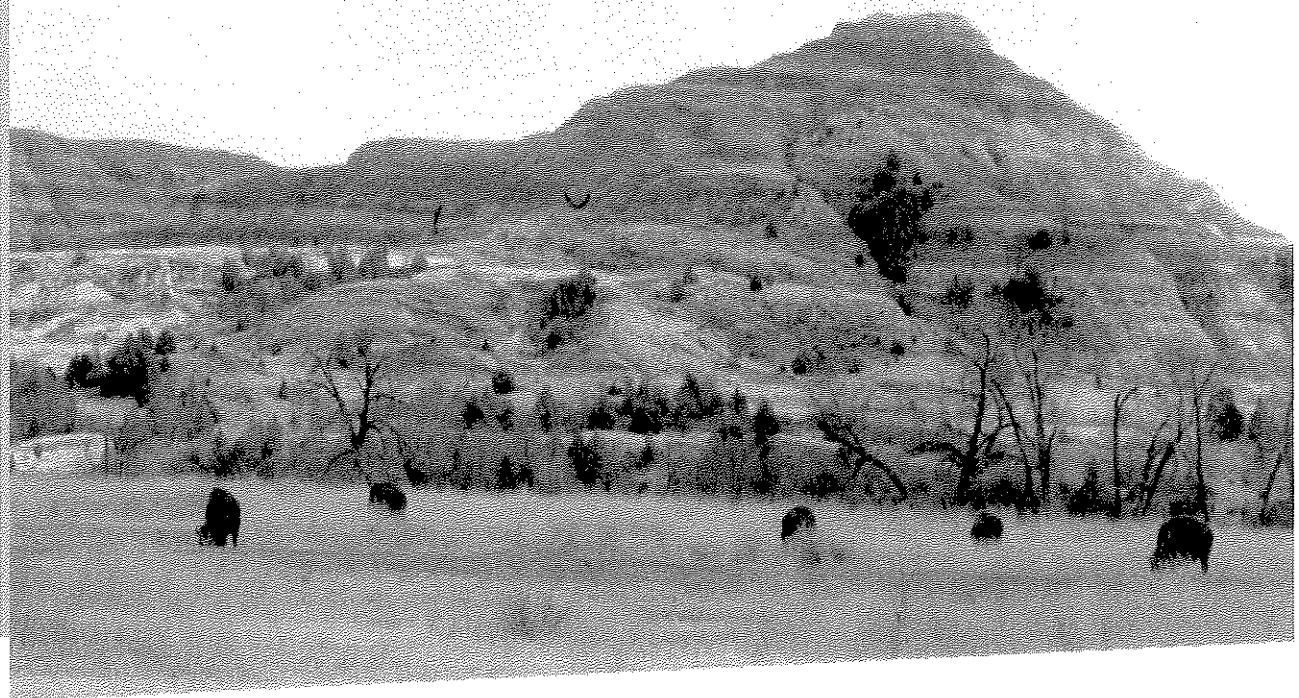
Prepared for:
Montana-Dakota Utilities Co.
Bismarck, North Dakota



Refined BART CALPUFF Visibility Modeling Analysis for Montana-Dakota Utilities Heskett Station

ENSR Corporation
May 2006
Document No.: 04721-006-400

Prepared for:
Montana-Dakota Utilities Co.
Bismarck, North Dakota



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1.0 Introduction

1.1 Background

The North Dakota Department of Health (NDDH) has conducted CALPUFF modeling for emission sources for all BART-eligible facilities in North Dakota. This study focuses upon CALPUFF modeling for one of these facilities, the Heskett Station (specifically, Unit 2). Heskett Unit 1, operational in 1954, has a capacity of 40 MW and is not BART-eligible since it was put into service before 1962. Unit 2, operational in 1963, has a capacity of 75 MW. Unit 2 was retrofitted to a fluidized-bed combustor in 1987.

The NDDH has provided information regarding CALPUFF modeling they conducted to determine whether the Unit 2 at the Heskett Station is subject to BART. Some of these predicted visibility impacts exceed the 0.5 deciview (dv) threshold for “contributing to impairment” at the Theodore Roosevelt National Park and the Lostwood Wilderness Area, as noted in EPA’s final BART rule published on July 6, 2005. The results are discussed in Section 3.0 of this report.

Recently, EPA has announced a court settlement agreement regarding BART that allows each state to use the annual average background visibility instead of the best 20% days’ background visibility. This change occurred because the actual BART rule (published in the July 6, 2005 *Federal Register*) stipulated that the annual average background visibility value should be used, while the preamble was inconsistent and mentioned that the 20% best days’ background visibility should be used.

For this analysis, ENSR conducted additional CALPUFF modeling with three appropriate refinements to the analysis conducted by the NDDH, as described below. This report documents the results of this modeling analysis.

1.2 Elements of the Refined Analysis

The three refinements that ENSR has considered in this alternative modeling analysis are summarized below.

- In the generation of the wind field, we have increased the grid resolution by a factor of 3 in the x and y directions by reducing the grid size from 3 km to 1 km. To make the runs manageable, we have set the modeling domain extent to 50 km beyond the modeled source and PSD Class I areas.
- To be consistent with other refined BART analyses, we have used guidance from the National Park Service on the speciation of particulate matter emissions into several components that have different light scattering potential: coarse matter, inorganic fine matter, elemental carbon, sulfuric acid mist, and organic aerosol fine particulate.
- In accordance with a recent EPA announced court settlement, we used the annual average background visibility to determine the change in visibility caused by the BART-eligible source under consideration.

The BART analysis modeling refinements are discussed in more detail in Section 2. The results of the new modeling runs and conclusions are presented in Section 3. References are provided in Section 4.

2.0 BART Analysis Refinements

Three refinements have been made by ENSR to the CALMET/CALPUFF modeling conducted by the NDDH for the BART determination for the Heskett Station Unit 2. Otherwise, the same CALMET and CALPUFF model versions used by the NDDH have been used in this modeling. The first step in the ENSR modeling was to replicate the results obtained by the NDDH with the modeling files and executable files that were supplied to ENSR. This step was completed satisfactorily.

2.1 Meteorological Processing with CALMET

One of the ENSR refinements involves the use of a 1-km grid size instead of the 3 km used by the NDDH. The digital terrain data used for this analysis consisted of 1-degree data (90-meter resolution). This change has the effect of better terrain and land use resolution for the CALPUFF modeling. No other changes to the CALMET processing from that which the NDDH did were made, except that the total grid domain was slightly reduced (to save on disk space) to provide a 50-km buffer around the source modeled as well as the PSD Class I areas. Figure 2-1 shows the modeling domain that ENSR used.

2.2 Particulate Matter Speciation

The National Park Service has issued guidance on how to divide, or speciate, particulate matter emissions into different constituents that have different light scattering EPA potential: coarse matter, inorganic fine matter, elemental carbon, sulfuric acid mist, and organic aerosol fine particulate. The guidance is located at <http://www.vistas-sesarm.org/BART/calpuff.asp> on the VISTAS regional planning organization web site. While NDDH did not include this guidance in its BART screening protocol, ENSR believes it is obligatory it be included in this analysis, even though it results in modeling higher visibility impacts.

Engineers from Montana-Dakota Utilities reviewed these speciation profiles and selected the data for a dry bottom PC with FGD and ESP controls spreadsheet as the most representative of the emissions from Heskett Unit 2. A series of Method 8 stack tests conducted August 24 – 26, 2000 found an average H_2SO_4 rate of 9.0 lb/hr (2.9 ppm) at full load. The resulting emissions used in the CALPUFF regional haze modeling are listed in Table 2-1. To simplify the modeling, the coarse and fine inorganic matter were combined as fine matter, which has a slightly higher visibility extinction efficiency than coarse matter.

Table 2-1 Heskett Unit 2 emissions data for refined BART modeling

Component	Emission Rate (lb/hr)
SO ₂	1475.5
NO ₂	227.5
Coarse matter	8.2
Inorganic fine matter	6.3
Elemental carbon	0.2
H ₂ SO ₄	9.0
Organic aerosols	2.0

ENSR input
file shows 302.8
for NO_x emission
rate, which is
correct

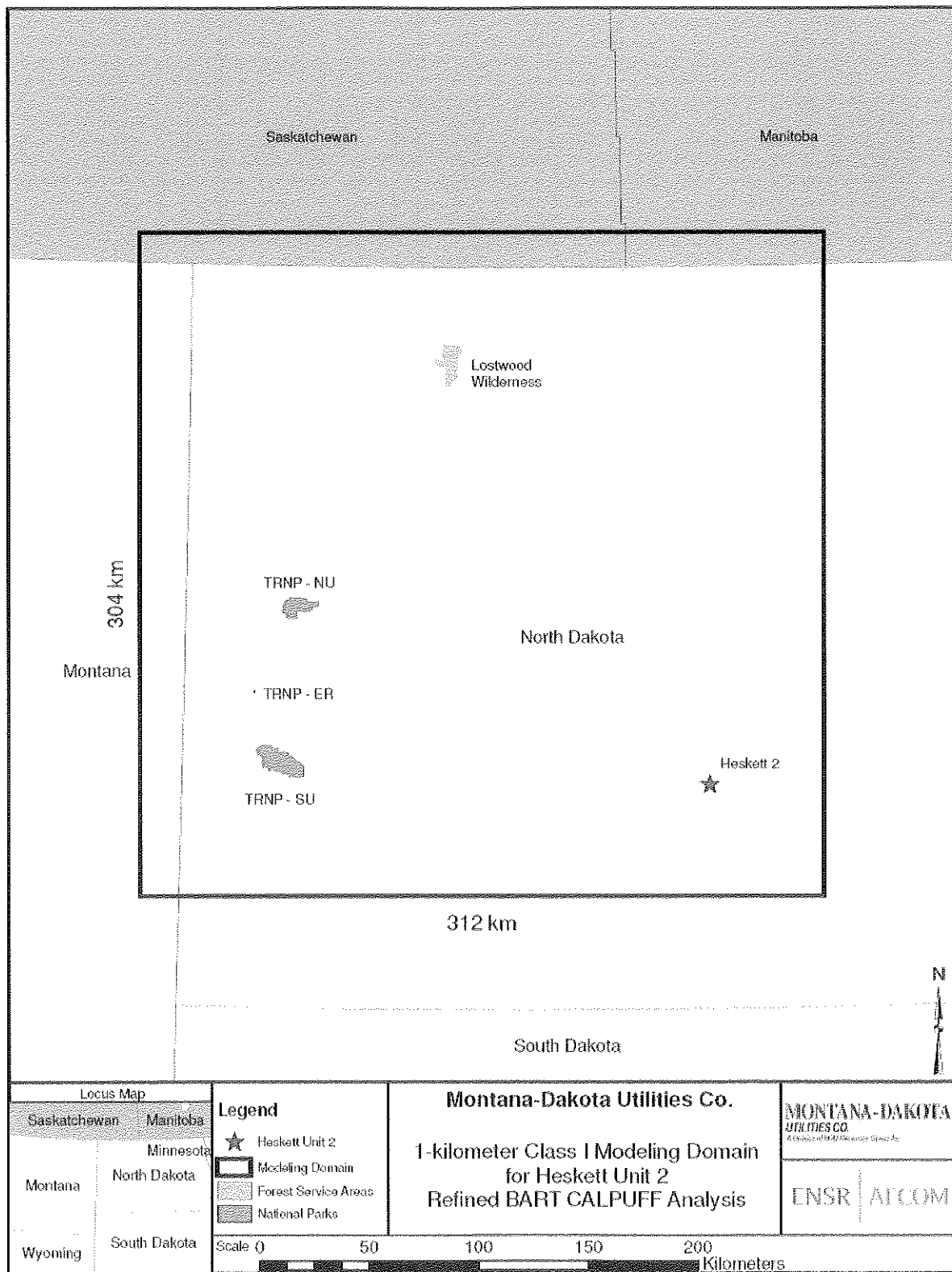
2.3 Natural Background Determination

The EPA final BART rule is ambiguous regarding the appropriate statistic to be used for the natural background level in deciviews. While the BART rule text indicates that the average annual value should be used, the preamble to the rule indicates that the best 20% days' value should be used. After the rule was published, EPA tried to clarify this issue and state that the best 20% days' value was actually intended. However, the Utility Air Regulatory Group challenged this interpretation in court. EPA has proposed a settlement to the litigation that indicates that each state can select either option. The NDDH has indicated that it is permissible for sources to use the annual average background visibility. The concentrations used in the CALPUFF input for the speciated particulate that contribute to visibility impairment are listed in Table 2-2, consistent with Table 3-7 in the NDDH final BART modeling protocol.

Table 2-2 Natural levels of aerosol components ($\mu\text{g}/\text{m}^3$)

Component	Annual Average West Region ⁽¹⁾	20% Best Days Theodore Roosevelt NP	20% Best Days Lostwood NWA
Ammonium sulfate	0.12	0.048	0.049
Ammonium nitrate	0.10	0.040	0.041
Organic carbon mass	0.47	0.189	0.190
Elemental carbon	0.02	0.008	0.008
Soil	0.50	0.202	0.203
Coarse mass	3.00	1.209	1.215
Natural deciview ⁽²⁾	-	2.19	2.21
(1) From "Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Program" (EPA, 2003), Table 2-1.			
(2) From "Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Program" (EPA, 2003), Appendix B.			

Figure 2-1 Modeling domain for 1 kilometer grid



3.0 Refined BART Analysis Results and Conclusions

A comparison of the NDDH and ENSR results are shown in Table 3-1. The results indicate that for all years tested, the ENSR refined BART modeling results indicate that all 98th percentile predictions of the change in visibility are below 0.5 deciviews.

Table 3-1 Comparison of NDDH BART results and ENSR BART results

NDDH BART Results (3-km grid, best 20% days' background, no PM speciation)	98 th Percentile Change in Visibility			
	TRNP South	TRNP North	TRNP Elkhorn Ranch	Lostwood NWA
2000	0.350	0.355	0.381	0.346
2001	0.351	0.536	0.400	0.583
2002	0.822	0.496	0.606	0.457
ENSR BART Results (1-km Grid, annual average background, with PM speciation)	98 th Percentile Change in Visibility			
	TRNP South	TRNP North	TRNP Elkhorn Ranch	Lostwood NWA
2000	0.201	0.267	0.217	0.278
2001	0.209	0.347	0.223	0.436
2002	0.428	0.397	0.388	0.224

Based upon these results, we conclude that upon verification of the modeling results by the NDDH, the Heskett Station Unit 2 does not cause or contribute to visibility impairment, and thus is not subject to BART.

4.0 References

Environmental Protection Agency, 2003b: Guidance for Estimating Natural Visibility Conditions under the Regional Haze Rule. EPA-454/B-03-005. U.S. Environmental Protection Agency, Research Triangle Park, NC.

North Dakota Department of Health. November 2005. Protocol for BART-Related Visibility Impairment Modeling Analyses in North Dakota (Final). North Dakota Department of Health, Division of Air Quality, 1200 Missouri Avenue, Bismarck, ND

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